April 15, 1941. H. PELCE ET AL 2,238,658

CIRCULAR WEAVING LOOM

Filed March 10, 1939 3 Sheets-Sheet 1

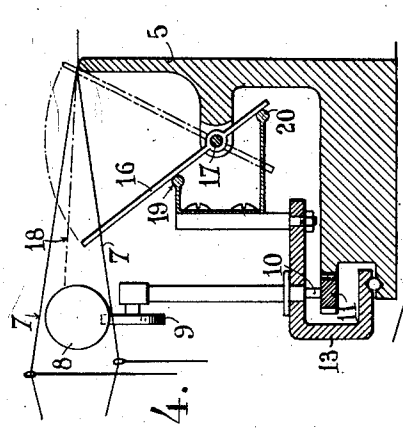


Fig. 4.

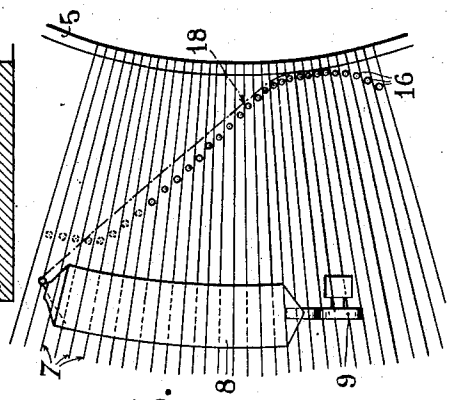


Fig. 5.

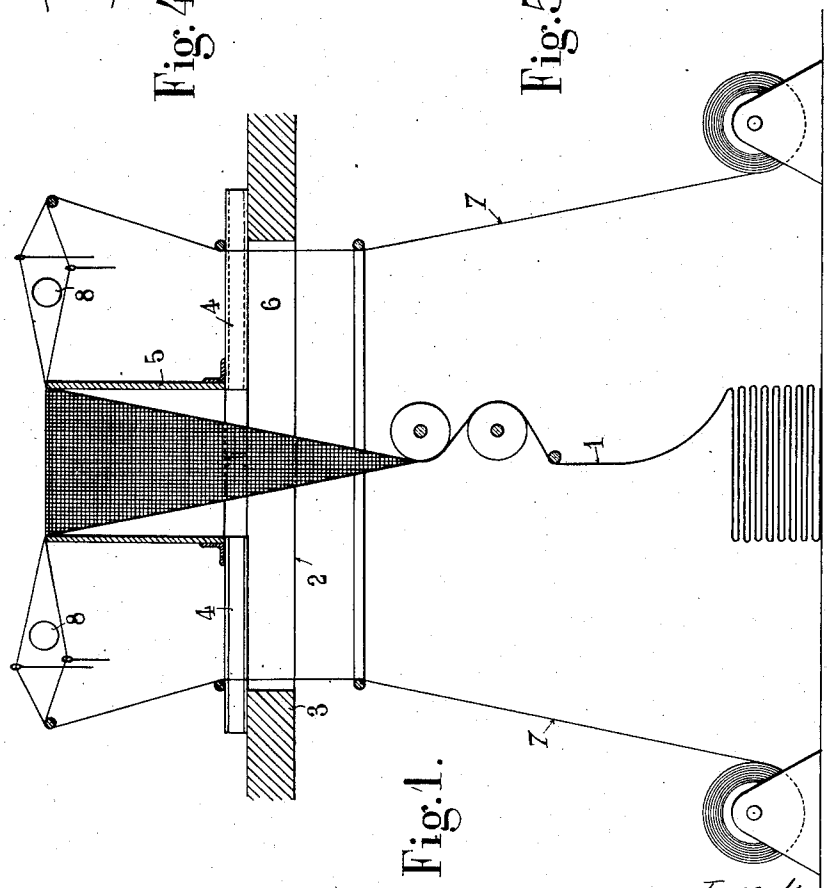


Fig. 1.

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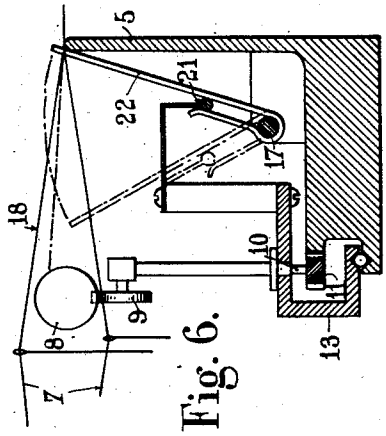


Fig. 6.

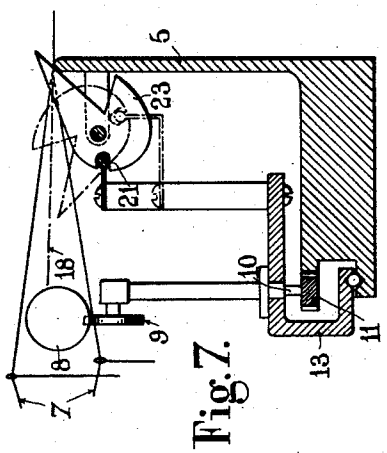


Fig. 7.

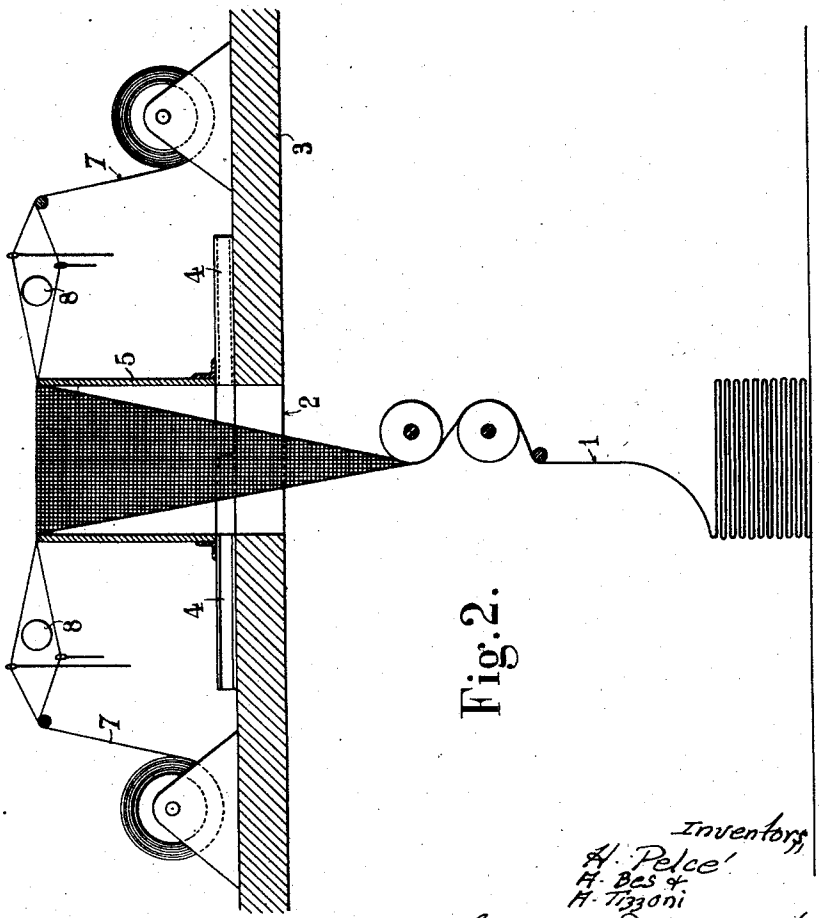


Fig. 2.

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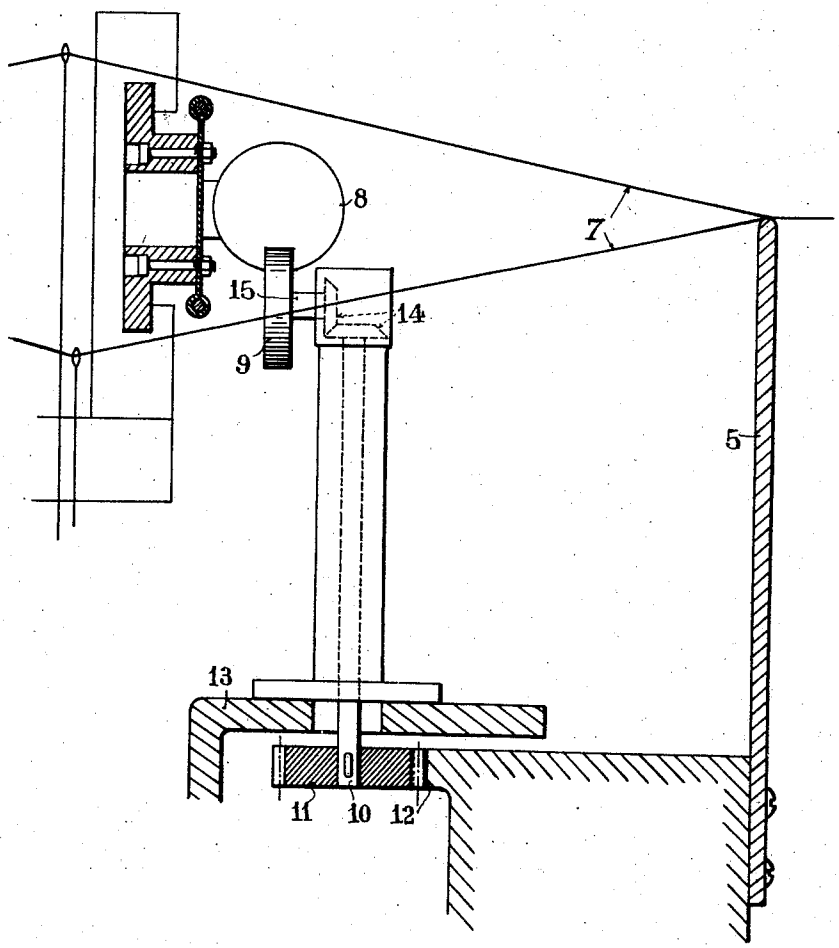
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Fig. 3.



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UNITED STATES PATENT OFFICE

2,238,658

CIRCULAR WEAVING LOOM

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Application March 10, 1939, Serial No. 261,076
In France March 15, 1938

2 Claims. (Cl. 139—13)

This invention has for object a particular arrangement of a circular weaving loom and of certain of its essential devices, the whole being devised in view of:

1. Rendering said loom easily accessible in the zone of formation of the sheds.

2. Providing the shuttles with means leaving the space above the zone of formation of the sheds and, in general, the centre of the loom, perfectly cleared.

The invention will be described with reference to the accompanying diagrammatic drawings, given by way of example only.

Figs. 1 and 2 illustrate in vertical section two modifications of the general arrangement of the circular loom according to this invention.

Fig. 3 is a partial vertical section showing a shuttle-pushing device.

Figs. 4 and 5 show in vertical section and in partial plan view a device serving to arrange the weft thread at the bottom of the shed.

Figs. 6 and 7 illustrate in vertical section two modifications of this device.

Considering, first of all, the well known disadvantages of circular weaving looms in which the fabric, as soon as it is produced, is not very accessible and, consequently, difficultly repairable, the loom according to the invention comprises a form of construction in stories (Figs. 1 and 2), or at least on pillars, or on a column, form of construction in which the fabric produced 1, urged downwardly and preferably to a different story, passes through all the propelling and rotating members of the loom itself.

All the members without exception are arranged below the working plane, distributed at different levels, and consequently, leave entirely free the weaving zone and a certain length of the fabric produced.

In the preferred arrangement, the loom is not only concentric with a hole 2 perforated in the floor of the building 3, but literally placed in space on a small number of cross members 4 so as to provide between the tubular base 5 of the loom and the body of the building, empty annular sectors 6. These empty sectors eventually allow of feeding the loom with warp threads 7 rising from the bottom, whereas the central hole 2 serves to send the fabric produced 1 to the lower story.

Concerning accessibility, the invention is therefore characterised by the fact that the fabric is made at the end of a rigid tube 5 concentric with a hole perforated in the floor, which tube is secured to the building, either directly, or by means of a few cross members if a free space is necessary between the loom and the building itself, for feeding, by this means, the loom with warp threads.

These warp threads reach the top of said tube 5 approximately at right angles to the latter. All the members necessary for propelling the shuttles, exchanging the warp threads and arranging the wefts at the bottom of the shed, have their source of energy and their bearing point outside the shed and below it, so that the top of the loom is entirely free and comprises no mechanical member.

Figs. 1 and 2, although diagrammatical, clearly show the principles of the general arrangement which form the basis of the invention.

The weaving means comprise, particularly, the members for propelling the shuttles, for exchanging the warp threads, and for tightening the weft at the bottom of the shed.

The shuttles 8 rotate in the shed, at a certain distance from the central tube 5, they are hung and guided by any suitable means and can be propelled by the action of rotating rollers the principle of which is known.

But, considering the general construction of the loom and the necessity of leaving entirely free from any mechanical member the centre of the loom as well as the weaving zone in which the undulating comb, described hereinafter, must eventually operate, the manner in which the rotary power is imparted to these rollers forms the object of a new device which forms part of the invention.

In the preferred device, the rotary movement of the roller 9 propelling each shuttle is produced by a vertical shaft 10 carrying a pinion 11 meshing with fixed spur teeth 12 concentric with the axis of the loom. Said shaft and said pinion are mounted on any circular member 13 rotating about the fixed teeth 12, and consequently they can themselves rotate with a planetary movement. By means of any suitable mechanical transmission 14, the rotation of said vertical shaft is transmitted to another substantially horizontal shaft 15 which carries the roller 9 propelling the shuttles, the principle of which is known, the whole being arranged for obtaining, according to this principle, a suitable direction of rotation and a suitable peripheral speed. The gearing 11, 12 illustrated could obviously be replaced by any other suitable gearing or by a friction device or a belt.

In the free zone between the rollers propelling the shuttles and the central tube is mounted a

device acting substantially as the batten of a straight weaving loom whilst being of very different structure.

This device or tightening comb is composed of a large number of elements 16 of small width, like the needles of platens used in knitting machines. But instead of sliding in grooves, the elements are threaded on a circular endless ring 17 with suitable intermediate elements leaving them great radial mobility; this ring 17 constitutes a fixed bearing point in height and in diameter.

These elements constitute many small levers movable in radial planes about the central tube 5, their common bearing point 17 being located below the shed and their free ends constituting a kind of circular reed in which the warp threads are more or less engaged. Substantially, each interval of this reed is intended for two warp threads, a lower thread which is completely engaged therein and an upper thread which, at some moments can be disengaged; during the lifting and lowering movements necessary for weaving, all the threads alternately assume, one or the other of these positions.

In addition to this intermittent action for guiding and supporting the warp threads in the vicinity of the central tube 5, the levers 16 in question can by a circular angular displacement about their bearing point 17, exert a radial stress utilizable for arranging the weft 18 at the bottom of the shed, exactly as the batten of straight looms, except that this action is distributed in space and in time, in a different manner.

This movement is determined by cams 19, 20 which rotate at the same speed and in the same direction as the shuttle propellers and compel the needles of the comb to alternately assume two extreme positions; the open position and the closed position.

The open position indicated in full lines (Fig. 4) is such that the needle considered is inclined towards the exterior of the loom its upper point being slightly below the surface generated by the weft thread. The needle at this moment is in engagement only with the lower threads.

The other position, closed position (traced in dot and dash lines) is such that the needle considered is either vertical, or rather inclined towards the interior of the loom, its upper point clearly extending above the two sheets of warp threads.

Between these two positions, the needles successively assume all the intermediate positions, but the shape of the cams and their arrangement in the loom are adjusted once for all so that the needle which is in the most open position is substantially in the empty zone separating two consecutive shuttles and that, by pivoting about its fixed point 17 it gradually assumes the closed position in proportion as the shuttle advances in its circular movement.

Now, whilst effecting this movement, the shuttle unspools the weft thread, so that, in proportion as the needles rise and engage farther and farther in the shed, they advance behind the weft thread which they thus push in front of them, up to the closed position, that is to say, up to the bottom of the shed (Fig. 5).

At this moment, the shape of the cams ensures the reverse movement of the needles 16, which leave the weft where they have pushed it, return rapidly to the open position from where they start again for effecting the same closing movement on the weft thread of the following shuttle.

These actions which have in fact the same result as that of the batten of straight looms, differ from the latter in that here, the tightening of all the threads cannot be effected at the same time, the shape of the cams must be gradual so that the needles assume their different positions without abnormal shocks; the path described by the ends of the needles is in reality a sinuous curve (Fig. 5), and for each needle the to-and-fro movement is reproduced at each passage of the shuttle. The tightening of each weft is therefore effected gradually up to the tightening point on the central tube 5, tightening which is exerted on a relatively small number of threads at a time. Of course, there are simultaneously as many tightening points as there are shuttles.

One of the most important advantages of this tightening undulating comb consists in the fact that whilst raking the part of the shed where the weft passes, it instantaneously leads towards the central nozzle not only the weft, but all the foreign or abnormal bodies which might be found in the shed: flock, broken threads, etc., which remedies, as well as the general arrangement of the loom, the inconveniences of circular weaving looms.

The positive action of both cams 19 and 20 on either side of the fixed axis 17 can be advantageously replaced by the also positive action of a single cam 21 (Fig. 6) acting on a needle 22 having two branches. The simplified use of needles restored by springs or acting themselves as springs can also be contemplated.

It is advantageous for obtaining a perfectly radial movement of the needles of the tightening combs which have just been described to guide them at points as near as possible to their free end, as, considering their flexibility, the reaction caused by the bosses of the cams controlling their undulating movement might space them from their normal plane of oscillation, sometimes in one direction, sometimes in the other.

Perfect guiding of the needles can be obtained by arranging, as near as possible to the upper sheet of warp threads, a fixed sheet metal plate perforated with grooves equal in number to that of the needles, these radial grooves compelling said needles to move in radial planes.

The perforated sheet-metal plate can be replaced by various assemblages of pins, steel wires, etc., acting in the same manner as a radial guide—it is moreover, not illustrated in the drawings.

A modification also of great value consists in the use of platens 23 (Fig. 7) which allow, by their special shape, arrangement of the weft 18 whilst maintaining the warp threads in engagement with the comb for a longer period of time; of course, the nose of these platens must periodically disengage from below the surface generated by the weft threads, as indicated in dot and dash lines in Fig. 7.

Furthermore, in the above description the word "needles" can be replaced by the word "platens" everywhere, as the same effect can obviously be obtained by flat cut out members as well as by round rods.

The unit comprising the elements 16 or 22 or 23 can also be divided into a certain number of groups each comprising several elements rigid with each other, which would give less points of friction on the cams and would lead to a more or less polygonal tightening comb.

We claim:

1. In a circular weaving loom, the combination of means for effecting the exchange of the

warp threads on either side of a horizontal plane at right angles to the axis of the loom and for causing the warp threads to advance radially from the exterior to the interior, a device for driving the shuttles carrying the weft threads, comprising a hollow support, a driving roller placed below the shed, rotatably mounted on said hollow support and adapted to push the shuttle in front of it, a plate rotatably mounted on the frame of the loom and capable of rotating about the axis of said loom and on which said hollow support is mounted so as to be rapidly and easily removable, said hollow support containing at least one movement transmission from a vertical shaft carrying a pinion meshing with a toothed crown wheel rigid with the frame of the loom and concentric with the axis of the loom, and a horizontal shaft externally carrying said driving roller and receiving its movement of rotation from said vertical shaft by transmission pinions.

2. In a circular weaving loom, a device for driving a shuttle on a circular track, comprising an annular element rotatably mounted on the frame of the loom, a tubular support secured on said annular element, a vertical shaft mounted in said support, a pinion secured on the lower end of said shaft and adapted to mesh with a circular set of teeth rigid with the frame of the loom, a horizontal shaft mounted on the upper end of said support, bevel pinions connecting said horizontal shaft to said vertical shaft, and a roller secured on said horizontal shaft and adapted to push the rear part of the shuttle.

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